Remarks

Reexamination and reconsideration of the present invention is respectfully requested in view of the following remarks.

Claims 1-23 are presently pending in this application.

Claims 4-23 have been withdrawn from consideration.

Objection to claim 1

In section 3 of the Office Action, claim 1 was objected to because of an informality.

Claim 1 has been amended to remove confusion regarding application of the term "at least about 90 percent". Also, the reference to "90 percent" has been amended to read "90 atomic percent" as requested.

Section 112 rejection of claim 1

In section 5 of the Office Action, claim 1 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 has been amended to change the phrase "at least about 90 percent" to read "at least 90 atomic percent" to overcome the rejection. Therefore, the Examiner is respectfully requested to remove this ground of rejection with respect to claim 1.

Section 103(a) rejection of claims 1-3

In section 7 of the Office Action, claims 1-3 were rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki et al. (U.S. Patent No. 5,998,016) in view of Kenji et al. (JP 63-299219 A).

Applicants respectfully traverse this ground of rejection for the following reason:

The combination of Sasaki et al. and Kenji et al. does not satisfy the requirement of MPEP § 2142 (Prima Facie Case of Obviousness).

The Examiner is respectfully informed that the references fail to establish a Prima Facie Case of Obviousness because, among other things, the references 1) do not suggest the desirability of the claimed invention (MPEP 2143.01), and 2) do not teach or suggest all the claim limitations of the invention (MPEP 2143.03).

References do not suggest the desirability of the claimed invention

Sasaki et al. teaches a spin valve magnetoresistive sensor comprising a free layer 24 having a current bypass layer 22 deposited on the back of the free layer and an anti-diffusion layer 23 deposited between the free layer and the current bypass layer (Fig. 2 and Col. 3, lines 18-22). Further, Sasaki et al. teaches "-- since the anti-diffusion layer 23 is inserted between the current bypass layer 22 and the free layer 24 so that the current bypass layer 22 does not directly contact with the free layer 24, no diffusion will occur during a heating process --" (Col. 5, lines 38-43). It is clear that Sasaki et al. teaches an anti-diffusion layer that acts as a barrier to diffusion from the current bypass layer to the free layer. The statement that the current bypass layer does not directly contact with the free layer implies that the anti-diffusion layer 23 is sufficiently thick to provide a physical barrier for diffusion from the current bypass layer to the free layer. In contrast,

Applicant's invention teaches nanolaminations defined to be laminated layers, on the order of a monolayer or less, that are discontinuous in their thickness (Page 3, lines 8-11). There is no suggestion in Sasaki et al. of the desirability of a nanolamination of a thickness that is discontinuous and therefore would allow direct contact of the current bypass layer with the free layer. Indeed, the requirement of no direct contact between the current bypass layer and the free layer teaches away from Applicant's claimed nanolamination which, by definition, is discontinuous in its thickness. Kenji et al. teaches a magnetic layer and a laminated nonmagnetic nitride film having a thickness of about 9 Å. Kenji et al. is silent with respect to a nanolamination. Therefore, there is no suggestion in the references of the desirability of Applicant's invention of a magnetic film comprising a magnetic alloy and at least a single nanolamination as claimed.

References do not teach or suggest all the claim limitations

Claim 1 of the invention recites the following limitation:

"at least a single nanolamination of a material selected from the group consisting of Al_2O_3, SiO_2, ZrO_2, yttria-stabilized ZrO_2, TiO_2, HfO_2, Ta_2O_5, Si_3N_4, AlN, B_4C, SiC, Si_4N_4, Ta, Zr, and Hf."

Nanolaminations are defined in the specification as "-- laminated layers, on the order of a monolayer or less, with a nominal thickness less than or equal to 3 Å." (Page 3, lines 8-9). The nanolaminations are further distinguished from the laminating layers of the prior art in that "--unlike the the laminating layers of the prior art, the nanolaminating layers of the present invention are discontinuous--" (Page 4, lines 9-10).

In contrast, Sasaki et al. teaches an anti-diffusion layer that acts as a barrier to diffusion from the current bypass layer to the free layer. Sasaki et al. teaches that the current bypass layer

22 does not directly contact with the free layer 24 implying that the anti-diffusion layer 23 is sufficiently thick to provide a physical barrier for diffusion from the current bypass layer to the free layer. Sasaki et al. teaches that the anti-diffusion material layer has a thickness equal to or more than 3 Angstroms. The Examiner states that Sasaki et al. disclose thickness values overlapping applicant's claimed limitation and makes reference to claim 11 of Sasaki et al. The Examiner is respectfully informed that the limitation of claim 11 that "--said anti-diffusion material layer has a thickness equal to or more than Angstroms." (Col. 10, lines 59-61) is indefinite since the metes and bounds are not defined. No inferences can be made as to whether the thickness is equal to or more than 1 Å , 100 Å or even 1000 Å. Applicant submits that there is no support in the Sasaki et al. specification for any thickness less than 3 Å. There is no teaching or suggestion of a nanolamination having a thickness equal to or less than a monolayer. Indeed, the teaching that there is no direct contact of the current bypass layer and the free layer teaches away from the discontinuous nanolamination of the claimed invention. Kenji et al. teaches laminations about 9 Å in thickness, a thickness considerably greater than the monolayer or less of the nanolaminations of the invention. The laminations of Kenji et al. are sufficiently thick to provide continuous layers. There is no teaching or suggestion of a nanolamination having a thickness equal to or less than a monolayer. Therefore, there is no teaching or suggestion in the references to the limitation of a nanolamination of the claimed invention.

Since the combined references (1) do not suggest the desirability of the claimed invention, and (2) do not teach or suggest all the claim limitations, Applicant submits that the Office has failed to establish a Prima Facie Case of Obviousness as required by MPEP 2142. Therefore, the Examiner is respectfully requested to reconsider and to withdraw this ground of rejection with respect to claim 1.

Since claims 2 and 3 are dependent on independent claim 1, and rejection of claim 1 has been overcome, the Examiner is respectfully requested to also withdraw the grounds of rejection with respect to dependent claims 2 and 3.

Section 103(a) rejection of claims 1-3

In section 7 of the Office Action, claims 1-3 were rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al. (U.S. Patent No. 4,608,297) in view of Kenji et al. (JP 63-299219 A).

Applicant respectfully traverses this ground of rejection for the following reason:

The combination of Shimada et al. and Kenji et al. does not satisfy the requirement of MPEP § 2142 (Prima Facie Case of Obviousness).

The Examiner is respectfully informed that the references fail to establish a Prima Facie Case of Obviousness because, among other things, the references 1) do not suggest the desirability of the claimed invention (MPEP 2143.01), and 2) do not teach or suggest all the claim limitations of the invention (MPEP 2143.03).

References do not suggest the desirability of the claimed invention

Shimada et al. teaches "-- a multilayer composite soft magnetic material comprising at least one amorphous magnetic alloy layer and at least one ***insulating material layer***, --" (emphasis added) (Col. 3, lines 46-49). The Examiner errs in stating that Shimada et al. refers to a ***nanolamination***. The insulating material layers of Shimada et al. range in thickness from about 30 Å (Col. 10, line 39 and Fig. 5) to 300 Å (Col. 8, line 16). The insulating material layers in the thickness range of 30-300 Å comprise many monolayers and are sufficiently thick to form

continuous layers. In contrast, Applicant's invention teaches nanolaminations defined to be laminated layers, on the order of a monolayer or less, that are discontinuous in their thickness (Page 3, lines 8-11). There is no suggestion in Shimada et al. of the desirability of a nanolamination of a thickness of a monolayer or less that is discontinuous. In fact, the data of Fig. 5 teaches away from Applicant's claimed invention having a nanolamination with a thickness in the range of 0.4-1.7 Å (Page 10, line 6) since the coercive force is shown to increase in going from a thickness of about 30 Å to zero thickness. Kenji et al. teaches a magnetic layer and a laminated nonmagnetic nitride film having a thickness of about 9 Å. Kenji et al. is silent with respect to a nanolamination. Therefore, there is no suggestion in the references of the desirability of Applicant's invention of a magnetic film comprising a magnetic alloy and at least a single nanolamination as claimed.

References do not teach or suggest all the claim limitations

Claim 1 of the invention recites the following limitation:

"at least a single nanolamination of a material selected from the group consisting of Al_2O_3, SiO_2, ZrO_2, yttria-stabilized ZrO_2, TiO_2, HfO_2, Ta_2O_5, Si_3N_4, AlN, B_4C, SiC, Si_4N_4, Ta, Zr, and Hf."

Nanolaminations are defined in the specification as "-- laminated layers, on the order of a monolayer or less, with a nominal thickness less than or equal to 3 Å." (Page 3, lines 8-9). The nanolaminations are further distinguished from the laminating layers of the prior art in that "--unlike the the laminating layers of the prior art, the nanolaminating layers of the present invention are discontinuous--" (Page 4, lines 9-10).

In contrast, Shimada et al. teaches "-- a multilayer composite soft magnetic material comprising at least one amorphous magnetic alloy layer and at least one ***insulating material layer*** , --" (emphasis added) (Col. 3, lines 46-49). The insulating material layers of Shimada et al. range in thickness from about 30 Å (Col. 10, line 39 and Fig. 5) to 300 Å (Col. 8, line 16). The insulating material layers in the thickness range of 30-300 Å comprise many monolayers and are sufficiently thick to form continuous layers. There is no teaching or suggestion of a nanolamination having a thickness equal to or less than a monolayer. Kenji et al. teaches laminations about 9 Å in thickness, a thickness considerably greater than the monolayer or less of the nanolaminations of the invention. The laminations of Kenji et al. are sufficiently thick to provide continuous layers. There is no teaching or suggestion of a nanolamination having a thickness equal to or less than a monolayer. Therefore, there is no teaching or suggestion in the references to the limitation of a nanolamination of the claimed invention.

Since the combined references (1) do not suggest the desirability of the claimed invention, and (2) do not teach or suggest all the claim limitations, Applicant submits that the Office has failed to establish a Prima Facie Case of Obviousness as required by MPEP 2142. Therefore, the Examiner is respectfully requested to reconsider and to withdraw this ground of rejection with respect to claim 1.

Since claims 2 and 3 are dependent on independent claim 1, and rejection of claim 1 has been overcome, the Examiner is respectfully requested to also withdraw the grounds of rejection with respect to dependent claims 2 and 3.

The other documents cited by the Examiner, but not applied to the claims currently in the application, have been reviewed and as understood, do not teach or suggest Applicants' claimed invention.

In view of the preceding remarks, Applicants believe that all the grounds for rejection have been overcome and the pending claims are in condition for allowance and such action is respectfully requested.

Respectfully submitted,

J. Westwood

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By: _____

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the claims:

Claim 1 has been amended as follows:

1.(AMENDED) A magnetic film comprising:

a magnetic alloy T-M-X wherein T is at least 90 atomic percent of one element selected from the group consisting of [at least about 90%] Fe, Co, and Ni, M is selected from the group consisting of B, Al, Si, P, Ti, V, Cr, Cu, Ga, Ge, Zr, Nb, Mo, Ru, In, Sn, Hf, and Ta, and X is selected from the group consisting of N, O, and C; and

at least a single nanolamination of a material selected from the group consisting of Al_2O_3, SiO_2, ZrO_2, yttria-stabilized ZrO_2, TiO_2, HfO_2, Ta_2O_5, Si_3N_4, AlN, B_4C, SiC, Si_4N_4, Ta, Zr, and Hf.